UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/423,066 | 11/01/1999 | STEFAN SCHAFFLER | P99.2243 | 6308 |

7590 02/06/2004

KEVIN R. SPIVAK
MORRISON & FOERSTER LLP
2000 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, DC 20006-1888

| EXAMINER | |
|---|---|
| DUONG, FRANK | |
| **ART UNIT** | **PAPER NUMBER** |
| 2666 | 11 |

DATE MAILED: 02/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. 09/423,066 | Applicant(s) SCHAFFLER, STEFAN | |
|---|---|---|---|
| | Examiner Frank Duong | Art Unit 2666 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *18 June 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☐ Claim(s) *20,21,23-33 and 35-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20,21,24-33 and 36-38* is/are rejected.

7)☒ Claim(s) *23 and 35* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1. This Office Action is a response to the amendments dated 06/18/2003. Claims 20 21, 23-33 and 35-38 are pending in the application.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 20-21, 24-333 and 36-38 are rejected under 35 U.S.C. 102(b) as being anticipated by Barbulescu (ITERATIVE DECODING OF TURBO CODES And OTHER CONCATENATED CODES, A Dissertation, University of South Australia, pages 1-145, February 1996.

In the thesis, Barbulescu investigates iterative decoding techniques applied to concatenated coding schemes. An optimized maximum a posteriori (MAP) decoding algorithm is described and compared with a soft output Viterbi algorithm. The optimized MAP decoding algorithm minimizes the symbol error probability, provides soft outputs as well as has a higher dynamic range than the Viterbi algorithm.

***(Applicant should note that any decoding techniques such as Barbulescu's MAP decoding algorithm; weighted output Viterbi algorithms; or soft-output Viterbi algorithms (SOVA-30 and SOVA-31) described in this thesis can clearly anticipate the broadly claimed invention of the base claims 1 and 10)***

Regarding **claim 20**, in accordance with the thesis entirety, Barbulescu discloses a method for determining at least one digital signal value (*0 or 1*) from an electrical signal (*QPSK signal*) transmitted via a transmission channel (AWGN channel), said electrical signal having signal information (*uncoded data bit dk*) and redundancy information (*coded bit Yk*) for the signal determined from the signal information (*note: on page 12, section 2.3 and thereinafter, Barbulescu discloses the MAP algorithm wherein soft output decision algorithm provides as an output a real number which is a measure of the probability of error in decoding particular bit. This can also be interpreted as a measure of the reliability of error in decoding a particular bit. This extra information is very important for the next stage in an iterative decoding process. Thus, the recitation thereat reads on the preamble of the claim*), the method comprising:

optimizing a target function (*log likelihood ratio*) having a model (graphical representation; page 16; section 2.8 or *AWGN channel with zero mean and variance; page 18, last paragraph*) of transmission channel (*discrete Gaussian memoryless channel or AWGN channel*) via which said electrical signal was transmitted (*see pages 16-19, section 2.8 and the advantages of the MAP algorithm listed on pages 24-25 to include minimizes (optimization) the symbol (bit) error probability*);

approximating a dependability degree ($\alpha$, $\beta$) for forming the signal value from said electrical signal based on said optimized target function (*see page 13-15, sections 2.4 and 2.5, Barbulescu shows the derivation/calculation/computation of* $\alpha$ *and* $\beta$ ); and

determining said digital signal value dependent on said dependability degree (*see page 20, section 2.9; especially equation 2.40*), wherein the model is a non-linear

regression model of said transmission channel (pages 17-18, Figures 2.2-2.3, Barbulescu shows the graphical representations of *α and β or page 18, last paragraph, Barbulescu discloses AWGN channel with zero mean and variance (corresponding to the claimed limitation of "the model is a non-linear regression model of said transmission channel")* .

Regarding **claim 21**, in addition to features recited in claim 20 (*see rationales pertaining the rejection of base claim 20 discussed above*), Barbulescu further discloses wherein said step of determining said digital signal value further comprises determining a number of digital signal values (*information bit sequence {dk}*) from said electrical signal (*QPSK signal*) (*see pages 12-13, section 2.3*).

Regarding **claim 24**, in addition to features recited in claim 20 (*see rationales pertaining the rejection of base claim 20 discussed above*), Barbulescu further discloses subjecting said target function (*log likelihood*) to a global minimization (γ) (*see pages 16-19, section 2.8)*.

Regarding **claim 25**, in addition to features recited in claim 20 (*see rationales pertaining the rejection of base claim 20 discussed above*), Barbulescu further discloses (*see pages 22-23*) wherein said dependability degree comprises an operational sign information (+,-) and an amount information (1) (*note page 23, Barbulescu discloses for a QPSK constellation where I=+/-1 and Q=+/-1*); and whereby the signal value is determined only dependent on the operational sign information (*note page 23, lines 1-2, Barbulescu discloses the energy per symbol is 2*).

Regarding **claim 26**, in addition to features recited in claim 20 (*see rationales pertaining the rejection of base claim 20 discussed above*), Barbulescu further discloses wherein said electrical signal is a systematic block code (*note page 7, last paragraph, Barbulescu discloses the described iterative decoding method is applied to the new class of turbo codes, product codes and Reed-Solomon codes (a systematic block code) concatenated with convolutional codes*).

Regarding **claim 27**, in addition to features recited in claim 20 (*see rationales pertaining the rejection of base claim 20 discussed above*), Barbulescu further discloses wherein said electrical signal is a radio signal (*note page 12, first paragraph, Barbulescu discloses the outputs of the encoder are modulated with a QPSK modulator and sent through an AWGN channel*).

Regarding **claim 28**, in addition to features recited in claim 20 (*see rationales pertaining the rejection of base claim 20 discussed above*), Barbulescu further discloses wherein said electrical signal is a restored signal of archived digital data (*inherent because on page 3, last paragraph to page 4, line 1, Barbulescu states that Shannon demonstrated that given a suitable channel encoder and decoder we can transmit digital information through the channel at a rate up to the channel capacity with arbitrarily small probability of error. Error control coding is the technique used to achieve this goal. Error control schemes add redundancy to the information sequence in such a way that the transmitted signals become more tolerant to the perturbations affecting the channel. The receiver uses this extra redundancy to correct the errors introduced by the channel*).

Regarding **claim 29**, the claim calls for an apparatus of the claimed method of claim 20. On page 4, in accordance with Fig. 1.4, Barbulescu show a concatenated coding system comprising INNER ENCODER, IDMC and INNER DECODER for implementing the MAP decoding algorithm discussed above in reference to the rejection of claim 20. The INNER DECODER reads on the claimed "a computer unit" for the same rationales applied in the rejection of claim 20 discussed above.

Regarding **claims 30 and 32**, in addition to features recited in base claim 29 (*see rationales pertaining the rejection of base claim 29 discussed above*) Barbulescu also discloses a receiver unit comprises an antenna (*not shown; inherent because on page 12, first paragraph, Barbulescu discloses the outputs of the encoder are modulated with a QPSK modulator and sent through an AWGN channel (a wireless channel). Thus, it is inherent there is a receiver comprises an antenna at the distant end to receive the modulated, noise additive signal over a wireless channel*). Also the claim is rejected by the same rationales applied to claim 21.

Regarding **claim 31**, in addition to features recited in base claim 29 (*see rationales pertaining the rejection of base claim 10 discussed above*) Barbulescu also discloses a demodulator unit (*not shown; inherent*) for the demodulation of the electrical signal that is connected via an input to the receiver unit an via an output to the computer unit (*note: It is inherent there is a demodulator because on page 12, first paragraph, Barbulescu discloses the outputs of the encoder are modulated with a QPSK modulator and sent through an AWGN channel. It is inherent there is a demodulator for reversing the modulating process at the receiving end).*

Regarding **claim 36**, the claim is rejected by the same rationales applied to claims 24 and 29 discussed above.

Regarding **claim 37**, the claim is rejected by the same rationales applied to claims 27 and 29 discussed above.

Regarding **claim 38**, the claim is rejected by the same rationales applied to claims 28 and 29 discussed above.

### *Allowable Subject Matter*

3. Claims 23 and 35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, considered individually or in combination, fails to fairly show or suggest the claimed invention of base claims 20 and 29 and further limit with the novel target function in a manner set forth as recited in the independent claims 23 and 35.

### *Response to Arguments*

5. Applicant's arguments filed 06/18/2003 have been fully considered but they are not persuasive. Applicant's arguments will be addressed hereinbelow in the order in which they appear in the response filed 06/18/2003.

In the Remarks of the outstanding response, on page 3, last paragraph, Applicant states "***In the invention, on the other hand*** *(emphasis added), the measure*

*of reliability, i.e., defined by the invention (see for example claims 20 and 29) as an approximation of the measure of reliability, is formed* ***in such a way that a target function, which includes a non-linear regression model of a transmission channel*** *through which ... Barbulescu fails to disclose such formation of the measure of reliability, as required by the invention ... the term "target function" does not appear in Barbulescu".*

In response Examiner respectfully disagrees for the following rationales:

First, Applicant argues based on the disclosed invention, not the claimed invention in the filed response. A careful review of the disputed claims Examiner find no such language as "*the measure of reliability is formed* ***in such a way that a target function, which includes a non-linear regression model of a transmission channel*** *through which the electrical signal is transmitted, is optimized".* Perhaps applicant refers to certain features that are disclosed in the present application but not recited in the rejected claims in making the contention that the Barbulescu reference fails to show certain feature of applicant's invention. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. *See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).*

Second, MAP decoding (maximum a posteriori decoding) algorithm is very well known as introduced in Barbulescu reference, on page 10. The original MAP algorithm (as stated by Barbulescu) is rather computationally intensive and required substantial memory. Over the years, different experts have discovered ways to modify the MAP algorithm to lessen the computation as well as memory needed by

optimizing/approximating the soft decision output or the log-likelihood ratio at the receiver end, and by carefully defining extrinsic information or state metrics ($\alpha$, $\beta$) as well as taking the AWGN channel into consideration. The motivation for doing so is due to the need for more bandwidth, transmission rate and the reliability of transmitted information. Barbulescu does take the AWGN channel (model) into consideration in his computation of the soft decision output at the decoder and subject the log likelihood ratio to optimization as disclosed in the Barbulescu reference and clearly pointed out in the Office Action. Contradistinction to the Applicant's argument, Barbulescu discloses the claimed invention as recited in the claims in the present condition.

Third, Examiner agrees with the Applicant that the term "target function" does not appear in Barbulescu reference. However, there is no specific definition for the disputed term in the claim. Thus, Examiner has given it the broadest, reasonable interpretation to corresponding to the "log likelihood ratio" disclosed by Barbulescu.

Examiner believes an earnest attempt has been made in addressing all of the Applicant's arguments. In the present condition, the claims do not reflect the disclosed invention, but the well-known MAP decoding algorithm disclosed by Barbulescu and other experts. Perhaps Applicant should further amend the claims to include the objected, but indicated allowable dependent claims 23 and 35 into the base claims in a response to this Office Action.

***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frank Duong whose telephone number is (703) 308-5428. The examiner can normally be reached on 7:00AM-3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on (703) 308-5463. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Frank Duong
Examiner
Art Unit 2666

January 29, 2004